31 January 1964

MEMORANDUM FOR THE RECORD

1. SUBJECT: PAR 205, Contract [redacted] Precision Enlarger, 4X

25X1

2. REFERENCES: a. [redacted] Quarterly Report, Contract [redacted] Second Quarter, FY 64.

b. Conference at P&DS, 23 January 1964.

3. ACTION REQUIRED: Clarification of Preliminary Specifications 103, as proposed by [redacted] in reference 2a, above.

4. ACTION TAKEN: Plans have been made for clarification and discussion of the following items at [redacted] 3-4 February 1964.

a. Negative Transport System.

(1) Advantages/disadvantages of the horizontal optic axis arrangement and vertical film position over vertical optical axis arrangement and horizontal film position.

(2) At slew speeds mentioned (300 fpm), braking on supply spool only is felt to put undue strain on the input film.

(3) "Joy-stick" control for X-Y positioning will attain what kind of accuracy?

(4) Film slewing speeds of 300 fpm appear excessively fast for safe handling.

(5) Type of X-Y measurement system proposed?

b. Optical Unit.

(1) Fluid gate-type fluid proposed, injection, etc.

(2) Interchange of lenses, condenser and lamp units, for changing magnification, appears to be a formidable effort when we are only looking for an optimum 4X enlargement.

c. Input Materials.

Same as those under PAR #204.

d. Output Materials.

Same as those under PAR #204 except that the resultant will be a 4X enlargement of a specific area.

e. Input Information.

Same as that under PAR #204.

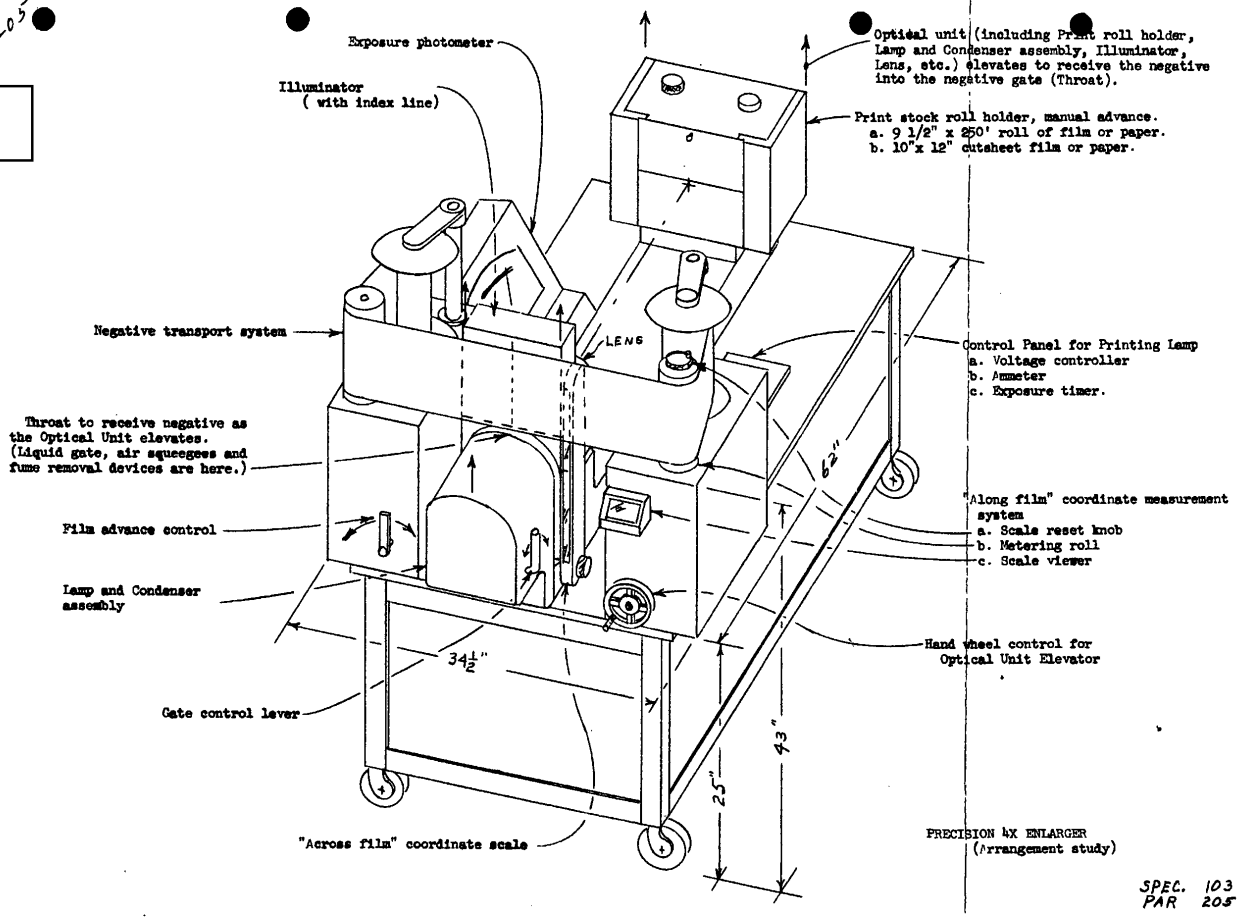
f. Discussion at this point should reveal that we are seeking a 4X enlargement printer containing essentially the same design parameters as in PAR #204.

5. COORDINATION: None required.

6. COPIES FURNISHED:

File PAR-205

25X1



PRECISION 4X ENLARGER
(Arrangement study)

SPEC. 103
PAR 205

13 Sept 63 RP

6 Dec 63

DESIGN OBJECTIVE

Precision Enlarger 4X (PAR #205)

Problem

The present practice of cutting small lengths from roll prints for detail photo interpretation work leads to many problems. There is a need to provide the photo lab with the capability to expose maximum quality film "chip" prints from selected small areas of the roll negatives.

This PAR is one of two approaches being considered to meet this need. Here, we propose to provide a maximum quality 4X print. The alternate approach (PAR #204) is to provide a maximum quality contact print.

Proposal

We propose to proceed with the Phase I development (concept and preliminary design studies) of the 4X Precision Enlarger in accordance with Specification No. 103 attached.

This project will draw heavily upon the 10-20-40X Enlarger experience. A new lens design is available on paper, providing 3.6X and probably convertible to 4X, which should approach the performance of the present 20X lens and be capable of exposing much greater area of the negative.

Spec No. 103

Preliminary Specification for
Precision Enlarger, 4X

This enlarger is intended to provide maximum quality prints from selected areas of roll form negatives. In a common case, one or two prints are required from a single selected area in given roll of negatives. The required negative area must be quickly presented to the printing gate from numeric specification of frame number and X-Y coordinates. In this design project, major emphasis is to be placed upon rapid, safe handling of the negative and upon achieving maximum possible image quality in the print image.

The proposed arrangement of the enlarger is indicated in the attached arrangement study drawing. Several features of this arrangement result from experience in construction and use of the 10-20-40X Precision Enlarger.

The horizontal optic axis arrangement is expected to provide more convenient access for handling the negative rolls, measuring and setting exposure level and print stock manipulation.

1. The Negative Transport System

The negative transport system is a derivative of the successful Motorized Rewind system with modifications to adapt into this instrument and to reduce its cost of construction. Breadboard tests of an arrangement using DC torque motors and electrically actuated brakes will be made.

a. The system will accept film widths from 70mm to 9½ inches and roll lengths up to 1000 ft. in 70mm and 500 ft. in other widths.

b. Brake application will be controlled by release of a foot switch and direction sensing switches in the torque heads permit braking only on the "supply" spool.

c. Direction and speed of film advance is controlled by a single axis "joy-stick".

d. Film slewing rate will be greater than on the 10-20-40X Enlarger, hopefully as high as 300 fpm.

e. X-Y coordinate measurement will be with safelight illuminated transparent scales arranged for uncomplicated, "natural" usage.

f. An illuminator with safelight filtering will permit observation of the negative outside the gate.

2. The Optical Unit

The optical system, consisting of the light source, the fluid gate for the negative, the interchangeable objective lens and the print stock roll holder are mounted upon a massive box form beam for the required stability. This entire unit is carried on shock mountings atop a counterbalanced elevator which can center and hold the printing gate at the desired across-frame coordinate on the negative.

a. The proposed lens for 4X magnification is a modification of a 3.6X "paper" design by Tropel (as yet unproven). The performance of this design is optimum for green light, hence the print stock must be "ortho" sensitized, such as SO242.

b. The lens and "lower" gate glass assembly, including the focus mechanism will be interchangeable to permit other magnification values with a common overall conjugate distance. 10-20-40X appear as logical possibilities although others are technically possible.

c. Interchange of lenses will require corresponding interchange of lamp and condenser units.

d. Interchangeable lens and condenser arrangement will permit adaptation to color systems; however, color capability is not presently included in the project.

e. The fluid injection system will use a pair of nozzles, one on each side of the film as in the 10-20-40X, but with a revised pumping system.

f. The print stock holder is a manual advance roll holder for 9½" x 250' film now being tested on the 10-20-40X Enlarger. The holder can accept 10" x 12" cut sheets if desired. The holder is mounted to make the length of the print stock web parallel to the length of the negative web to preserve the approximate orientation of the images upon the films.

g. The print image will extend the full width of the 9½" or 10" print stock and will be masked to approximately 9" along the print web. The corners of this area will be masked to a circle about 10-1/2 inches diameter to conform to the expected lens field. Titles will be exposed on the print by supporting a transparent title strip ("frisket") near or on the print film during the image exposure.

3. Exposure Monitoring and Control

a. Measurement of the required print exposure is done by a commercial photoelectric easel photometer (Macbeth EP-1000).

b. Exposure may be controlled by adjustment of lamp voltage and/or of exposure time.

c. Starting and ending of the exposure is by turning on and off the printing lamp.

d. The design goal for exposure speed is to expose through a negative area with 3.0 diffuse density to about 0.05 above fog on SO242 print stock in less than 20 seconds exposure (4X, F/3.0 lens with W61 (green) filter or an equivalent double-dichroic).

4. General Arrangement

a. The exterior surface arrangement of the instrument is planned for ease of cleaning as required for maintaining clean working areas for film handling.

b. The instrument base will be caster mounted for easy mobility with provision to install fixed feet each upon a stack of "ISOMODE" pads in a semi-permanent location.

c. Required external services to the instrument are:

1. Single phase 115v a. c. electrical power. (_____watts.)

2. Clean, dry air under pressure (50 to 75 psig and _____cfm) to operate the air squeegees.

3. Blower exhaust at 100 to 150 cfm for lamp cooling and injection fluid fume removal.

4. Vacuum at 2 to 10 psig and _____cfm cap. for print stock holding.

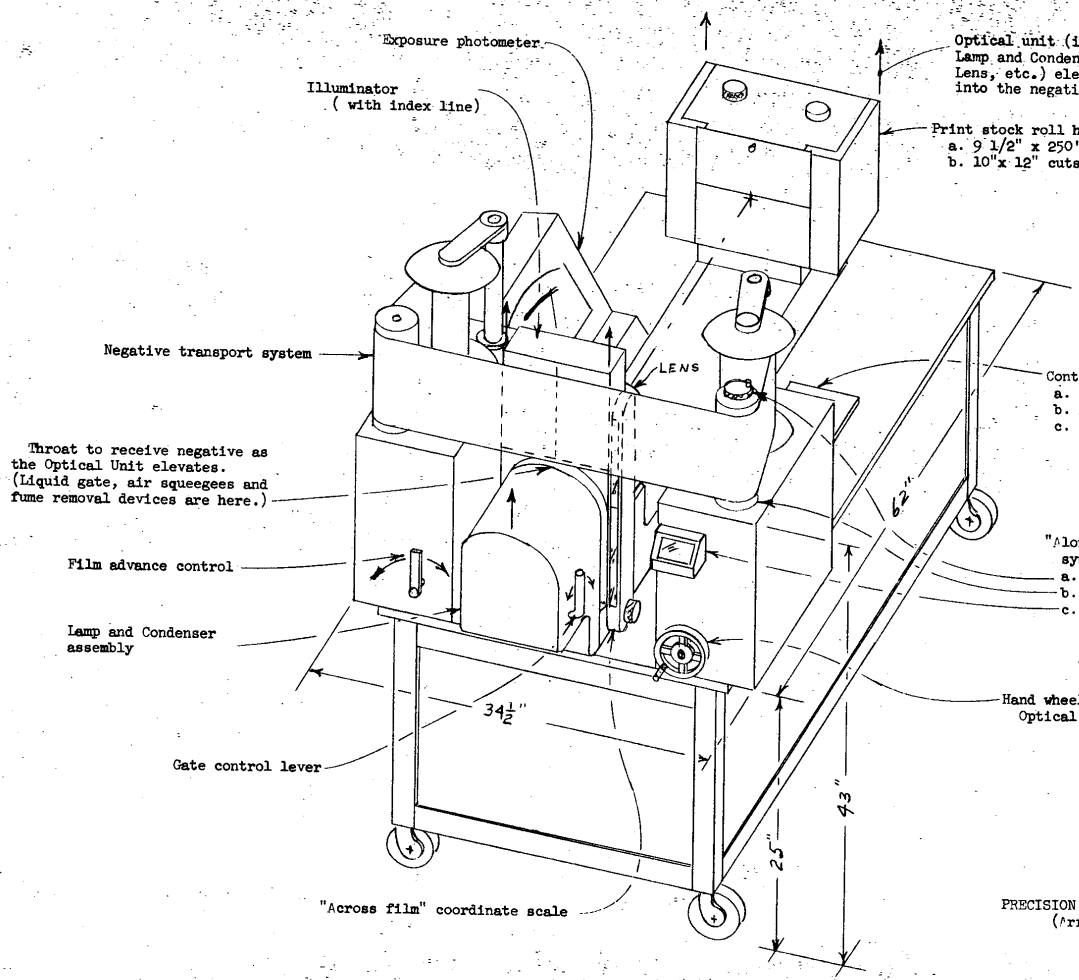
NOTE: Equipment to supply items (2), (3), and (4) from 115v a. c. electrical supply should be available if the services are not available at the customer's location.

d. The width of the instrument shall not exceed that to permit its passage through a standard 36" doorway. The door may be removed from its hinges if necessary.

e. Overall length should not exceed 6 ft.

f. Work area is an air conditioned clean room at 65 to 80°F, 50% RH with photographic safelights (red).

g. Storage and transport at 0°F to 130°F and 0% to 100% RH should not damage the instrument.



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SPEC. 103
PAR 205

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